

Research Article

REVIEWING CHALLENGES AND TECHNIQUES OF USING ENERGY IN IRAN HEALTH SYSTEM

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ABSTRACT

Increasing energy consumption and its consistent growth besides limited resources emphasizes attention to the necessity of saving energy consumption. The aim of this study is to develop managerial challenges and techniques for controlling energy consumption in health- medicinal domains. Performance technique used in this study was surveying articles which are collected through reviewing related passages and articles and library resources. Most Iranian hospitals often use traditional and old technology for providing light and illumination; and lack of specialists in this field, due time repair and maintenance and improper utilization of energy equipment in hospitals are considered as the main problems in this section. Energy consumption management in health and medicinal centers should be made with the aim of reinforcing culture, knowledge and energy consumption optimization behavior in hospitals, and managers' acquaintance with modern technologies in the field of energy management.

Keywords: *Energy, Management, Health- Medicinal*

INTRODUCTION

Passing of time shows that human life is more and more related to different kinds of energy. World population growth, increase of energy consumption per capita, limitation of non-renewable energy resources and reserves, costliness of exploitation and utilization of different kinds of energy in modern world, has converted the manner of energy consumption to an important and main problem. Energy is considered a necessary tool for development of individual and social life including consumption in residential and non-residential buildings, industry, transportation and agriculture, from which the most important and highest level of energy consumption includes domestic and commercial consumption. Considering the necessity of energy resource limitation, environmental changes and economic policies, different organizations and institutes face several challenges (Nezarati and Ekhlesi, 2010). It is worth mentioning that more than 35 percent of Iran energy productions are used in domestic and commercial sections (of course, hospitals and medicinal centers are classified as domestic section) and this percentage is very high compared to developed and even developing countries. And, considering high financial expenses and environmental complications, decreasing this proportion compared to industrial consumption, transportation and agriculture is of main necessity.

Hospitals and medicinal centers are considered as the most essential organizations of any society and their strategic situation in front of critical accidents and their main role in adding health level and welfare of the country, has increased the sensitivity of the subject and makes the ability of this center in controlling current expenses and consuming the benefit produced from controlling expenses and savings of energy expenses to fulfill the main mission of these centers for delivering suitable medical services to the patients and also paying the wage of health service providers very important (E.C.M.R, 2010). We should remember that every purpose requiring general culture making will succeed very late and slowly. Therefore, before the crisis time arrives, we should begin working and enter a new level of performing optimization process. Gradually when the price of energy reaches to the international level considering the globalization of economy and commerce, its irregular consumption and loss will damage the national wealth and economic cycle and will endanger the environment and will challenge the productivity of hospitals and other medicinal centers with a serious challenge, Therefore, it will be very important to find ways to save energy in medicinal centers (Sheikh, 2005).

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The Importance of Proper Energy Utilization

Statistics and figures provided in researches about health care and in the frame of ENERGY STAR programs, show that energy consumption in hospitals is much more than other service institutes. The elementary reviews show that increasing the price of energy carriers will increase the expense of health and medicinal centers. Of course hospitals have high capacity for saving energy and we may reduce the energy consumption in hospitals by 20%, while in developed countries like Germany and Holland the possibility of energy saving is by 40% and 44% respectively. Considering the role of energy in the stable development of country and price increase to reach universal prices, the management performance of energy section should be evaluated very carefully and continuously (R.E.C.W, 2007). The aim of energy consumption is to access the organization purposes and use energy optimally with the lowest cost. The strategic situation of hospitals and medicinal centers confronting critical accidents and their main role in increasing the level of health and welfare has increased the sensitivity of the subject. On one side, the relatively high number of these centers and their high need for energy carriers, and also their long work hours (many of these centers work 24 hours) has made energy assessment in medical centers very important (E.C.M.R, 2010).

In Iran, there are nearly 120.000 hospital beds in more than public and private hospitals and nearly 18.000 health houses and 2600 health and medicinal centers and thousands of clinical centers like drugstore, dentistry, radiology, laboratory, and physiology, each of which, considering the existing medical equipment in these centers and their full time services, highly consume energy carriers for equipment, illumination and providing heat. The main reasons for energy consumption in different sections of Iran hospitals include increasing hospital beds, importing new equipment and tools consuming energy and especially electrical appliances in clinical units, increasing social welfare level, and change in hospital equipment, change of climatic conditions and increasing need for electrical cooling and heating systems, cheapness of energy rate and tariffs before purposefulness of subsidies, low efficiency and output of different electric appliances in the country, disobeying correct energy consumption models by personnel and patients and finally the discussion of high energy consumption losses in hospital building and installations.

Iran buildings consume energy 6 times more than European countries and 40 percent of electrical and non-renewable energy is consumed for buildings. Meanwhile hospitals don't have distinct and independent statistics in energy consumption but, because of the importance of utilizing different hospital equipment, it will be clear that they consume energy more than residential, administrative and commercial buildings (E.C.M.R, 2010).

Difficulties of Energy Providing in Hospitals

Considering the existing sensitivity in hospitals, we may divide the problems of providing energy in hospitals to four sections:

1. The low efficiency of power generation in country: This problem is a national problem and means that considering the low efficiency of power generation in Iran (between 33 to 36%), the main part of national wealth is always wasted.
2. Lack of stability and security in providing electricity: Considering the existing problems in generation and distribution of power, we may not be sure about its continuous provision. This problem will affect the hospitals and medicinal centers negatively.
3. Emergency generators: In many hospitals, emergency generators which work with diesel oil are used for power generation in emergency. These generators besides their low efficiency and dissemination high level of polluting gases are not provided with proper capacity. Their very high capacity causes increasing purchase, energy and repair and maintenance expenses.
4. The difficulties of hospital managers: Include expenses management, environmental, repair and maintenance problems of HVAC system (Sadrizade, 2001)

Energy Consumption Management in Medicinal Systems

Managing energy consumption in health and medicinal centers should be made with the aim of reinforcing culture, knowledge and behavior of optimizing energy consumption in hospitals, acquaintance

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of managers with modern technologies in energy management and promoting creative methods to reduce the expenses of energy consumption.

Considering that the main electrical energy consumers in countries are buildings, we should assess the energy consumption of hospitals and medicinal centers. Many of existing hospitals in Iran use old technology for illumination and lack of specialists in this field, lack of repair and maintenance in due time and improper utilization of energy equipment in hospitals is the main problem of this section. Therefore, it is necessary that people be introduced for education by hospitals and after passing the related course control the electrical energy consumption of different parts of hospital (E.C.M.R, 2010).

Another efficient technique for energy management, is reengineering energy system design in hospitals especially illumination which is completely controllable through making consuming appliances smart (Sadrizade, 2001). Always two subjects have been internationally attracting in health economy: the share of governments in health expenses and share of health section from gross domestic product: In Iran government share has been estimated to be 7-9% and the share of health section has been announced to be around 5.6-6.

Managers and economists should try to organize the production function in hospitals to modify the energy intensity in hospitals while energy intensity in all parts of the country is very high. Therefore, establishing a new position in health centers under the title of energy supervisor for managing energy consumption will be very important for saving expenses of energy section. Energy supervisor is responsible for energy assessment in the center, finding the nonsense locations of energy, and thinking about alternative ways of producing energy in the hospital. Another main point is using renewable and clean energies, like nuclear energy, solar energy and gas which reduce energy cost and at the same time don't have environmental bad effects (A.E.U.O.H.). Energy expenses in Iran are estimated to be 10% of current expenses and in some countries it reaches to 30%; but considering that in hospitals the most manageable expense is energy cost, we may work on it from two aspects: using alternative energy and essential review of pay mechanisms in health section and financial providing of health system (E.C.M.R, 2010).

Fossil based fuels have two important features: on one side, they are cheap for the consumer and especially Iranian consumer, Therefore, saving disciplines are not considered in its consumption, i.e. its production and consumption is not managed. On the other hand they pollute environment. In Iran despite the proof of fossil fuel pollution, its cheapness, being local and available, keeps us from thinking to alternative energy resources. Therefore, the consumption of energy carriers per capita in Iran is 4 to 5 times more than advanced countries. On the other hand the energy consumption intensity is very high in all parts of country which shows the low efficiency of energy in Iran (Asefzadeh, 2003). Another subject of energy consumption management is energy combination. Nowadays more than 80% consumed carriers in Iran is fossil based fuel.

We should use different kinds of energy especially clean energies like nuclear, solar and gas in our energy consumption basket which despite of high capacity of many parts of country, their application intensity is very low (Mossadegh, 2004). Even in our power generation plants, not so much gas is used. On the other hand, according to the studies made, the potential of reducing energy consumption is estimated to be between 40 to 50 percent, and with a simple calculation we may find that its financial value is equal to 10 billion dollar a year (E.S.I, 2011). Statistics show that domestic energy consumption intensity is nearly equal to 15 times of Japan, more than twice of China and 2.5 times of global average.

Case studies show that fossil fuel consumption indices before and after optimization are equal to Mj/m³ 3000 and Mj/m³ 1800 respectively and power consumption indices before and after optimization have been reported to be equal to kWh/m³ 1302 and kWh/m³ 1002 which its saving potential is more than 20%. Studies show that nearly 10 percent of current expenses of hospitals should be used for purchasing energy carriers.

Therefore, increasing these carriers will have significant effect on hospital and health section expenses. These calculations warn us that health ministry and health and medicinal centers, public and private should seriously pay attention to consumption management and energy expenses.

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Methods of Reducing Energy Consumption in Medicinal Centers; 5 Techniques for Saving Energy in Hospitals

Medicinal centers may play a significant role in reducing energy consumption through a series of interruptions including the following:

- Installing chronometer considering the consumption time of heating and cooling systems and reducing the work hour of Lengeri and Autoclove from 12 hours to 7 hours.
- Substituting LED lamps by high consumption halogen lamps if the LED is provided by reliable authority and technical considerations. Considering the diversity of LED lamps, the technical and economic specifications of these lamps should be followed accurately (R.E.C.W, 2007).
- Defining energy label for hospital building components: Building energy label is a suitable and efficient way to explain energy consumption standard in buildings and assess the level of energy consumption optimization while designing and during building usage (I.E.U.O., 2006).
- Limiting the use of glass in building façade and using two-layer windows to prevent the loss of energy but buildings with glass facade have many problems and waste energy very much.
- Smart-making the illumination system by providing a suitable model to reduce energy consumption and smart making the illumination systems of administrative and public buildings.
- Smart- making the air conditioners: Because the share of air conditioner and cooling or heating in different climates is very different (P.R.E.A.A., 2005).
- Using power taps to reduce water consumption
- Installing heat insulators for power plant tubes (Nezarati and Ekhlasi, 2010) .

Discussion and Conclusion

Lack of energy consumption standards in building section, lack of custodian for pursuing energy consumption optimization in buildings (energy management), improper and incomplete use of new technologies in building section are the main causes for lack of energy efficiency in Iran hospital buildings. Therefore, management of energy consumption in health-medicinal centers should be made with the aim of reinforcing culture, knowledge and behavior of energy consumption optimization in hospitals, acquaintance of managers with modern technologies in energy management and promoting creative methods to reduce energy consumption costs. We hope that in near future, we may achieve our purposes in saving and energy consumption cost in all hospital units being built or under reconstruction, by applying efficient management systems dependant on modern technical knowledge and promoting science and action along with performance control.

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